SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

Optimal control of focused ultrasound surgery

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Resumo: High intensity focused ultrasound can be generated by phased array transducers containing up to several hundreds of ultrasound element. This can be used to locally heat up cancer tumors and destroy them through ablation. The amount of damage caused is often modeled with *Cumulative Equivalent Minutes* (CEM) also called thermal dose. In focused ultrasound surgery of a tumor the goal of a treatment is to find a good compromise between achieving a target dose in the tumor and sparing the healthy tissue. To find a time series of parameter values for the transducer which minimize a goal function formulating this compromise is an optimal control problem. Mathematically this means to control the parameters of a heat source in the bio heat equations such that integrated thermal dose approximates the target dose optimally according to the chosen goal function. I will talk about the different challenges in this problem and show numerical examples.